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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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EXAMINER

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PAPER NUMBER

2612

DATE MAILED:

05/18/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

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Office Action Summary

Application No.
09/496,607

Applicant(s)

Neter

Examiner

Andy Christensen

Art Unit

2612



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirements.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892) 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 19) ☐ Notice of Informal Patent Application (PTO-152)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 2 20) ☐ Other:

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 1-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the readout circuit" in line 8. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3, 6, 7, 9, 10, 13-16, 18, 22, 25, 27-29, 31, 32, 34, and 36 are rejected under 35 USC 102(b) as being anticipated by Boisvert et al. (U.S. Patent No. 5,329,312).

Regarding Claim 1, Boisvert et al. disclose a color imaging system providing on-the-fly color interpolation using analog signals to reconstruct colors during sensor readout (See Column 14, Lines 26-27 where a modified signal level of a respective color signal is inserted between its preceding and its following color signals by means of the sequential gain control), comprising an

array of pixel sensor elements (12); a color filter including a plurality of color filter components organized in a predefined pattern, the color filter overlaying at least a portion of the array (Column 6, Lines 28-30); a readout control circuit (Column 6, Lines 30-38); an array controller (Figures 1 and 2) coupled to the array, wherein the readout circuit and the array controller reconstruct color components for at least a portion of the array while the readout control circuit is reading at least the portion of the array (Column 6, Lines 38-45).

Regarding Claim 3, Boisvert et al. disclose that the readout control circuit is adapted to read a plurality of pixel sensor elements in parallel (Figure 1).

Regarding Claim 6, Boisvert et al. disclose that the readout control circuit is programmable to read a first pixel element in a first mode and to read a second pixel element in a second mode (See Column 1, Line 57; NTSC, where the first mode is for odd pixels and the second mode is for even pixels).

Regarding Claim 7, Boisvert et al. disclose that the pixel elements form a portion of a CCD (Column 6, Lines 16-17).

Regarding Claim 9, Boisvert et al. disclose a first programmable gain amplifier adapted to amplify a first color readout signal a first amount and a second programmable gain amplifier

adapted to amplify a second color readout signal a second amount (Figure 1; Column 5, Lines 16-18 and 40-41).

Regarding Claim 10, Boisvert et al. disclose that the programmable gain amplifiers are implemented as a separate stage (Figure 2).

Regarding Claim 13, Boisvert et al. disclose that the programmable gain amplifiers have different transfer functions (Column 5, Lines 16-17).

Regarding Claim 14, Boisvert et al. disclose that at least a portion of the pixel sensor elements are active (Column 6, Lines 30-38).

Regarding Claim 15, Boisvert et al. disclose that at least a portion of the pixel sensor elements are passive (Column 12, Lines 27-30).

Regarding Claim 16, Boisvert et al. disclose that at least a first pixel sensor element is associated with a different color filter component than a neighboring pixel sensor element (Column 6, Lines 28-29).

Regarding Claim 18, Boisvert et al. disclose that the predefined pattern comprises the

colors of red, blue and green (Column 6, Line 29).

Regarding Claim 22, Boisvert et al. disclose that the readout control circuit and the array controller process a first set of pixel sensor elements and then process a second set of pixel sensor elements, such that the second set of pixel sensor elements does not overlap the first set of pixel sensor elements (Column 12, Lines 28-31; row by row readout).

Regarding Claim 25, Boisvert et al. disclose a television coupled to the readout control circuit (Column 1, Line 20).

Regarding Claim 27, Boisvert et al. disclose a monitor coupled to the readout control circuit (Column 1, Line 20).

Regarding Claim 28, Boisvert et al. disclose a camera coupled to the readout control circuit (Column 1, Lines 17-18).

Regarding Claim 29, Boisvert et al. disclose a method of interpolating color components of an array of pixel sensor elements, the method comprising reading a portion of an array of pixel sensor elements and reconstructing color components for at least a portion of the array while the portion of the array is being read (See Column 6, Lines 31-45 where a modified signal level of a

respective color signal is inserted between its preceding and its following color signals by means of the sequential gain control).

Regarding Claims 31 and 32, Boisvert et al. disclose that reconstructing color components is performed in real time and in the analog domain (Column 6, Lines 31-45).

As to Claim 34, see the discussion of Claim 22.

Regarding Claim 36, Boisvert et al. disclose summing a plurality of values associated with a plurality of pixel sensor elements associated with a first color (red) to produce a first color component and summing a plurality of values associated with a plurality of pixel sensor elements associated with a second color (blue) to produce a second color component (See Column 8, Lines 35-37 where the dark level associated with each color component is algebraically summed with the signal level to remove dark current).

3. Claim 38 is rejected under 35 USC 102(b) as being anticipated by Freeman (U.S. Patent No. 4,774,565).

Freeman discloses a color imager comprising a first light sensor, a second light sensor, and an interpolation circuit configured to receive a first and second output signal and provide on-the-fly-interpolation based on the first and second output signals (Column 5, Lines 9-15).

4. Claims 39-41 are rejected under 35 USC 102(b) as being anticipated by Yatsuyama et al. (JP10-108209).

Regarding Claim 39, Yatsuyama et al. disclose a method of interpolating a color value in the analog domain in real time comprising receiving first and second analog signals corresponding to the outputs of first and second pixels that are separated from each other and sense light intensity of a first color, and generating an analog interpolation signal used to create a color value for a location between the first and second pixel elements based on the first and second analog signals (See Figure 6 and SOLUTION).

Regarding Claim 40, an image in Yatsuyama et al. is based on the first, second and interpolation signals (See SOLUTION).

Regarding Claim 41, Yatsuyama et al. read a third pixel element located in a line of pixels, skip a fourth pixel element in the line, and read a fifth pixel element located in the line of pixel elements (See Figure 6).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the

manner in which the invention was made.

5. Claims 2 and 30 are rejected under 35 USC 103(a) as being unpatentable over Boisvert et al. in view of Younse et al. (U.S. Patent No. 4,805,023).

Regarding Claim 2, Boisvert et al. disclose all of the limitations except for the recited comparator circuit and delay element. However such is well known in the art for correcting an image for pixel defects, as disclosed in Younse et al. (Figure 2; Column 2, Lines 4-27). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate in Boisvert et al. the recited comparator circuit and delay element, as taught in Younse et al., in order to improve image quality by correcting the image for pixel defects.

As to Claim 30, see discussion of Claim 2.

6. Claims 4, 5, 21, and 33 are rejected under 35 USC 103(a) as being unpatentable over Boisvert et al. in view of Sato et al. (U.S. Patent No. 4,245,241).

Regarding Claim 4, Boisvert et al. disclose all of the limitations except that of the recited analog line storage units. However Sato et al. disclose such an arrangement for a color image sensor (See Column 1, Lines 61-65; Column 3, Lines 9-36), a process by which the resolution is enhanced (Column 1, Lines 65-67; Column 3, Lines 34-36). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to configure the Boisvert et al. device to have the filter design of Sato et al. and to employ the recited first and second analog line storage in order to enhance the resolution of the device.

Regarding Claim 5, Boisvert et al. and Sato et al. disclose that the analog storage units are capacitors (See Column 5, Lines 46-59 of Sato et al. where the sample and hold circuits clearly have capacitors).

Regarding Claim 21, Boisvert et al. disclose all of the limitations except that of the readout control circuit and array controller processing a first set of pixel sensor elements and then processing a second set of pixel sensor elements such that the second set overlaps a portion of the first set. However it is well known in the art to so process pixel data of a color image sensor in order to enhance the resolution of the device, as disclosed in Sato et al. (Column 1, Lines 61-67; Column 3, Lines 9-36). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to configure the Boisvert et al. device have the filter design of Sato et al. and to configure the readout control circuit and array controller so as to process a first set of pixel sensor elements and then process a second set of pixel sensor elements such that the second set overlaps a portion of the first set in order to enhance the resolution thereof.

As to Claim 33, see discussion of Claim 21.

7. Claims 8, 17 and 19 are rejected under 35 USC 103(a) as being unpatentable over Boisvert et al.

Regarding Claim 8, although Boisvert et al. is silent regarding the manufacturing process

used for the pixel sensor elements, the sensor elements are not limited to a particular CCD element (Column 15, Lines 37-39) and CMOS technology is taught in Column 3, Lines 29-31. Although difficult to implement for the ASPs (Column 3, Lines 29-30), it would have been obvious to use CMOS technology for the pixel elements for applications where low cost, small size and uniform quality are a priority, as suggested in Column 3, Lines 20-21).

Regarding Claims 17 and 19, the Boisvert et al. device is not limited to a particular CCD imaging unit or to R,G,B colors (Column 15, Lines 37-39) therefore clearly suggesting to one skilled in the art that complementary colors or a Bayer filter for RGB may be used, both configurations being very well known in the art.

8. Claims 11 and 12 are rejected under 35 USC 103(a) as being unpatentable over Boisvert et al. in view of Zhou et al. (IEEE).

Regarding Claims 11 and 12, Boisvert et al. disclose all of the limitations except those of the programmable amplifiers being contained within the pixel circuitry of the array and within a plurality of column buffers. However such a design for amplifiers used with an image sensor is well known in the art as disclosed in Zhou et al. (See Figures 1 and 2) and clearly would reduce the size of the Boisvert et al. device. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to configure the Boisvert et al. device so as to have its programmable amplifiers contained within the pixel circuitry of the array within a plurality of

column buffers in order to reduce the size of the device.

9. Claim 20 is rejected under 35 USC 103(a) as being unpatentable over Boisvert et al. in view of Sano et al. (IEEE).

Boisvert et al. disclose all of the limitations except that of a micro-lens layer. However such a design for an image sensor is well known in the art and increases the sensitivity of the device, as disclosed in Sano et al. (Figure 2; Abstract). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to configure the Boisvert et al. device so as to have a micro-lens layer in order to increase its sensitivity.

10. Claims 24 and 37 are rejected under 35 USC 103(a) as being unpatentable over Boisvert et al. in view of Roberts (U.S. Patent No. 5,541,654).

Regarding Claim 24, Boisvert et al. disclose all of the limitations except that of the readout control circuit and the array controller only processing a sub-region of the array. However such an operation for an image sensor is well known and increases the utility of the device by permitting output of selected array portions at selected frame rates, as disclosed in Roberts et al. (See Figure 6 and Column 10, Lines 9-20). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to configure the Boisvert et al. device so that its readout control circuit and array controller only processes a sub-region of the array in order to increase its utility by permitting output of selected array portions at selected frame rates.

As to Claim 37, see discussion of Claim 24.

11. Claims 23 and 35 are rejected under 35 USC 103(a) as being unpatentable over Boisvert et al. in view of Yatsuyama et al. (JP10-108209).

Regarding Claim 23, Boisvert et al. disclose all of the limitations except that of the readout control circuit and the array controller processing a first set of pixel sensor elements, skipping a second set of pixel sensor elements and processing a third set of pixel sensor elements. However such an operation for a color image sensor is well known in the art as a means for more efficiently providing missing color information for a given pixel, as disclosed in Yatsuyama et al. (See Figure 6 and SOLUTION). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to configure the Boisvert et al. device so that its readout control circuit and array controller processes a first set of pixel sensor elements, skips a second set of pixel sensor elements and processes a third set of pixel sensor elements in order to more efficiently provide missing color information.

As to Claim 35, see discussion of Claim 23.

12. Claim 26 is rejected under 35 USC 103(a) as being unpatentable over Boisvert et al. in view of Kondo et al. (U.S. Patent No. 5,640,202).

Boisvert et al. disclose all of the limitations except that of a personal computer being

coupled to the readout control circuit. However it is well known in the art to couple a personal computer to the readout control circuit of a camera in order to enable advanced image processing of the output image data, as disclosed in Kondo et al. (Column 5, Line 33; Column 2, Lines 38-44). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to couple the Boisvert et al. readout control circuit to a personal computer in order to enable advanced image processing of the output image data.

13. Claim 42 is rejected under 35 USC 103(a) as being unpatentable over Yatsuyama et al. in view of Roberts.

Yatsuyama et al. disclose all of the limitations except the recited windowing operation. However such an operation for an image sensor is well known and increases the utility of the device by permitting output of selected array portions at selected frame rates, as disclosed in Roberts (See Figure 6 and Column 10, Lines 9-20). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to configure the Yatsuyama et al. device so as to perform a windowing operation in order to increase its utility by permitting output of selected array portions at selected frame rates.

14. Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, DC 20231

or faxed to:

(703) 872-9314 (for informal or draft communications; please label "PROPOSED" or "DRAFT").

Hand-delivered responses should be brought to Crystal Park 2, 2121 Crystal Drive, Arlington, VA., Sixth Floor (Receptionist).

15. Any inquiry regarding this communication or earlier communications from the examiner should be directed to Andy Christensen whose telephone number is (703) 308-9644.

If attempts to reach the examiner by telephone are unsuccessful the examiner's supervisor, Wendy Garber, can be reached on (703) 305-4929.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 305-4700.

ac
May 17, 2001



ANDREW B. CHRISTENSEN
PRIMARY EXAMINER